Jet Propulsion Laboratory
California Institute of Technology

NASA Aeronautics and Space Database for Bibliometric Analysis

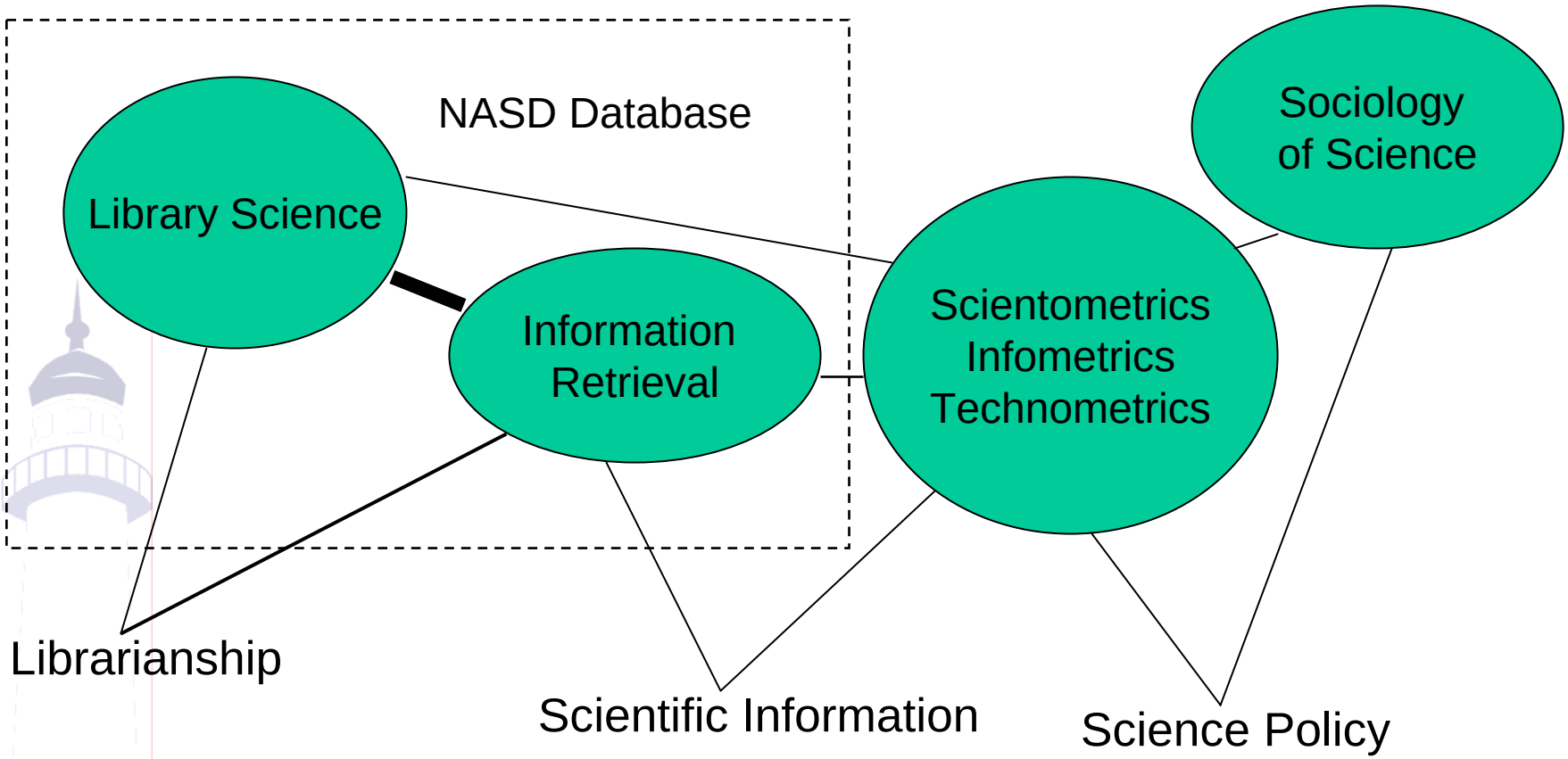
Presentation for February 18, 2004 STI Meeting

By Robert Powers &
Rachel Rudman

Library,
Archives,
and
Records

Section 273

What is Bibliometric Research?



Adapted from W. Glanzel
Bibliometrics as a research field, 2003

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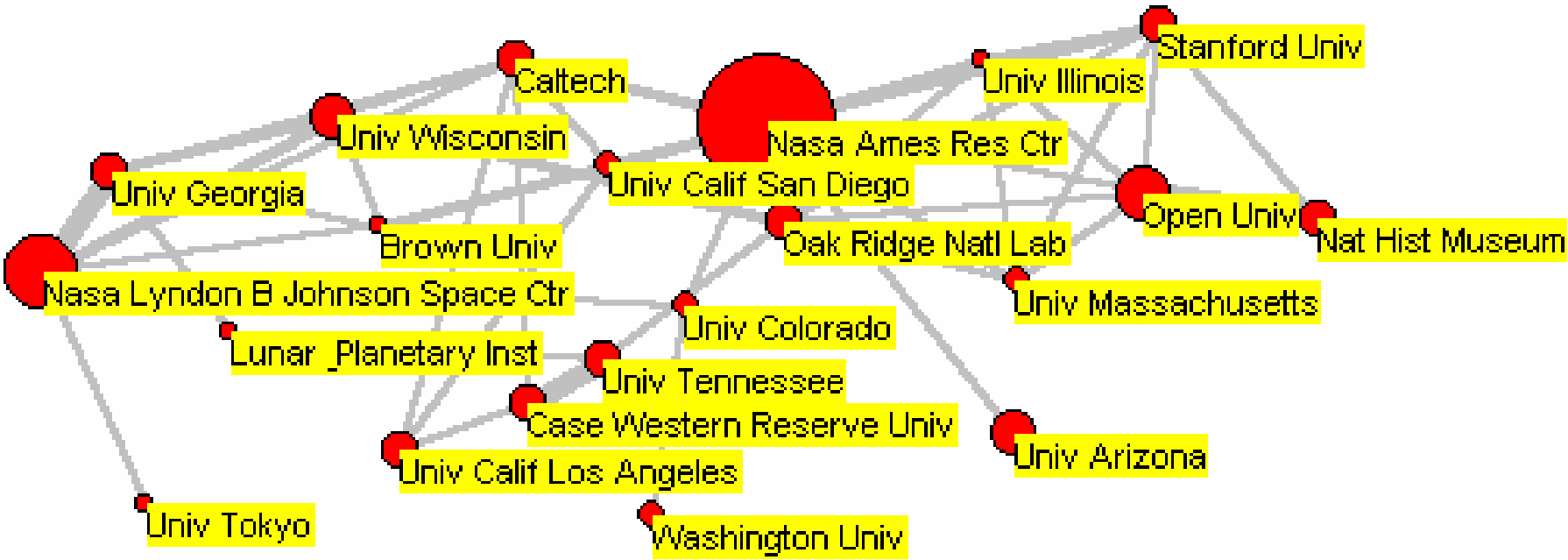
Science Citation Database:

One known source for bibliometrics

ISI Scisearch Data:

Life on Mars: Institutions Citing McKay DS (Science, 273: (5277) 924-930 AUG 16 1996) Paper



Source: Bibexcel website at
http://www.umu.se/inforsk/astrobiology/mappingcomplex.htm

How Can NASA Aeronautics and Space Database be used?

- Unique Content related to Aerospace literature
- Author/Affiliation, Corporate Sponsor indexing
- Good subject indexing
- Classification of records into a hierarchy
- Long history of data

Unique Content

JPL Authored Citations 1990-2000			
Database	**Citations**	**Dups Removed**	**Unique Citations**
NASA Recon	7084	0	7084
Science Citation Index	6855	2	6853
INSPEC	5677	1094	4583
Compendex	1515	508	1007
Total	21131	1604	19527

Author/Affiliation Data

Author and Affiliation	A combined field containing the author name(s), affiliation(s), and location(s).	Ramos, R.; NASA Ames Res. Center
Financial Spons. Info.	A combined field containing the name And location of the financial sponsor, as well as other relevant information.	NASA Glenn Research Center; Cleveland, OH, United States
Org. Source Info.	A combined field containing the Performing organization and location.	Rotary Power International, Inc.; Wood-ridge, NJ, United States
Org. Name	A multifield index combining the Organization names for author affiliation, meeting sponsor, financial sponsor, and organization source fields.	Nasa miami univ.

Subject Data

NASA Major Term	Terms selected from the NASA Thesaurus indicating Major concepts of the document.	Turbofan engines Rotor aerodynamics Engine design Rotor stator interactions
Subj. Category Text	The text name of the NASA subject category.	08 - aircraft stability and contro 19 - spacecraft instrumentation

Two Examples Using NASD

- Micro/Nano Technology Development
- Collaboration between NASA Centers

Case 1: Micro/Nano Device Technology

Problem: need to develop relationships with key universities. What are top universities worldwide for MEMS/NEMS Technology?

Subproblem: which are active in space related technology?

Part of solution = NASD

- Plan subject search – most critical step ← Narrowed to 2201 Records
- Plan on output fields – Auth/Affil or Org Source or Org Name field? ← Selected Auth/Affil
- Export data in XML format ← 7107 Auth/Affil lines
- Clean up data ← 1375 Unique Auth/Affil lines
- Tabulate numbers by affiliation

Top Institutions Ranked by NASD Citations

MEMS/NEMS Technology for Space Applications: NASD Database 1999 - 200

Count of Institution	
Institution	Total
Massachusetts Institute of Technology	96
Oak Ridge National Laboratory	83
NASA Ames Research Center	79
Tohoku University	66
Jet Propulsion Lab.	62
Chinese Academy of Sciences	61
Osaka University	61
NASA Goddard Space Flight Center	58
Cornell University	57
Materials Science Division	50
Princeton University	48
University of Cambridge	46
NASA Glenn Research Center	45
Delft University of Technology	44
Department of Energy	44
Harvard University	42
Arizona State University	41
Stanford University	41
Universitat Wurzburg	39

Rankings with Department Details Shown

	A	B	C
1	MEMS/NEMS Technology for Space Applications: NASD Database 1999 - 2003		
2			
3	Count of Institution		
4	Institution	Department	Total
5	Massachusetts Institute of Technology	Department of Aeronautics and Astronautics	2
6		Department of Chemical Engineering	2
7		Department of Electrical Engineering and Computer Science	17
8		Department of Material Science and Engineering	4
9		Department of Materials Science and Engineering	29
10		Department of Mechanical Engineering	5
11		Department of Nuclear Engineering	2
12		Department of Nuclear Engineering and Department of Materials	1
13		Department of Physics	2
14		Media Laboratory	11
15		(Dept. not listed)	21
16	Massachusetts Institute of Technology Total		96
17	Oak Ridge National Laboratory	Center for Computational Sciences	4
18		Center for Engineering Science Advanced Research	3
19		Chemical Sciences Division	8
20		Condensed Matter Sciences Division	7
21		High Temperature Materials Laboratory	2
22		Life Sciences Division	8
23		Metals and Ceramics Division	1
24		Solid State Division	20
25		(Department not listed)	30
26	Oak Ridge National Laboratory Total		83
27	NASA Ames Research Center		79

And Finally with Author Information Displayed

	A	B	C
1	MEMS/NEMS Technology for Space Applications: NASD Database 1999 - 2003		
2			
3	Count of Institution		
4	Institution	Authors	Total
5	Massachusetts Institute of Technology	Amirtharajah, R.;	1
6		Argon, A. S.;	1
7		Barbastathis, George;	1
8		Brenizer, Marshall;	1
9		Burg, T. P.;	2
10		Castano, F. J.;	6
11		Cheng, J. Y.;	3
12		Cooper, E. B.;	1
13		Eilez, A.;	1
14		Epstein, Alan H.;	1
15		Farhoud, M.;	2
16		Fedkiw, Peter;	1
17		Firebaugh, Samara L.;	1
18		Fritz, J.;	2
19		Gil, D.;	1
20		Goodman, R. B.;	1
21		Hao, Y.;	5
22		Haratani, S.;	3
23		Horn, Mark W.;	1
24		Hwang, M.;	2
25		Jensen, Klavs F.;	2
26		Jeon, Yongbae;	1
27		Joppin, C.;	1
28		Kerrebrock, J. L.;	1
29		Kim, Sang-Gook;	1
30		Knoch, J.;	1
31		Langer, Robert;	1
32		Li, Ju;	1
33		Manalis, S. R.;	3
34		Miki, N.;	1
35		Novikov, Dmitry S.;	1
36		Nowak, Robert;	1
37		Paur, Richard;	1
38		Ross, C. A.;	8
39		Rothschild, M.;	1

Case 2: NASA Center Collaboration

- Question: to what extent are the NASA Centers co-authoring papers together?

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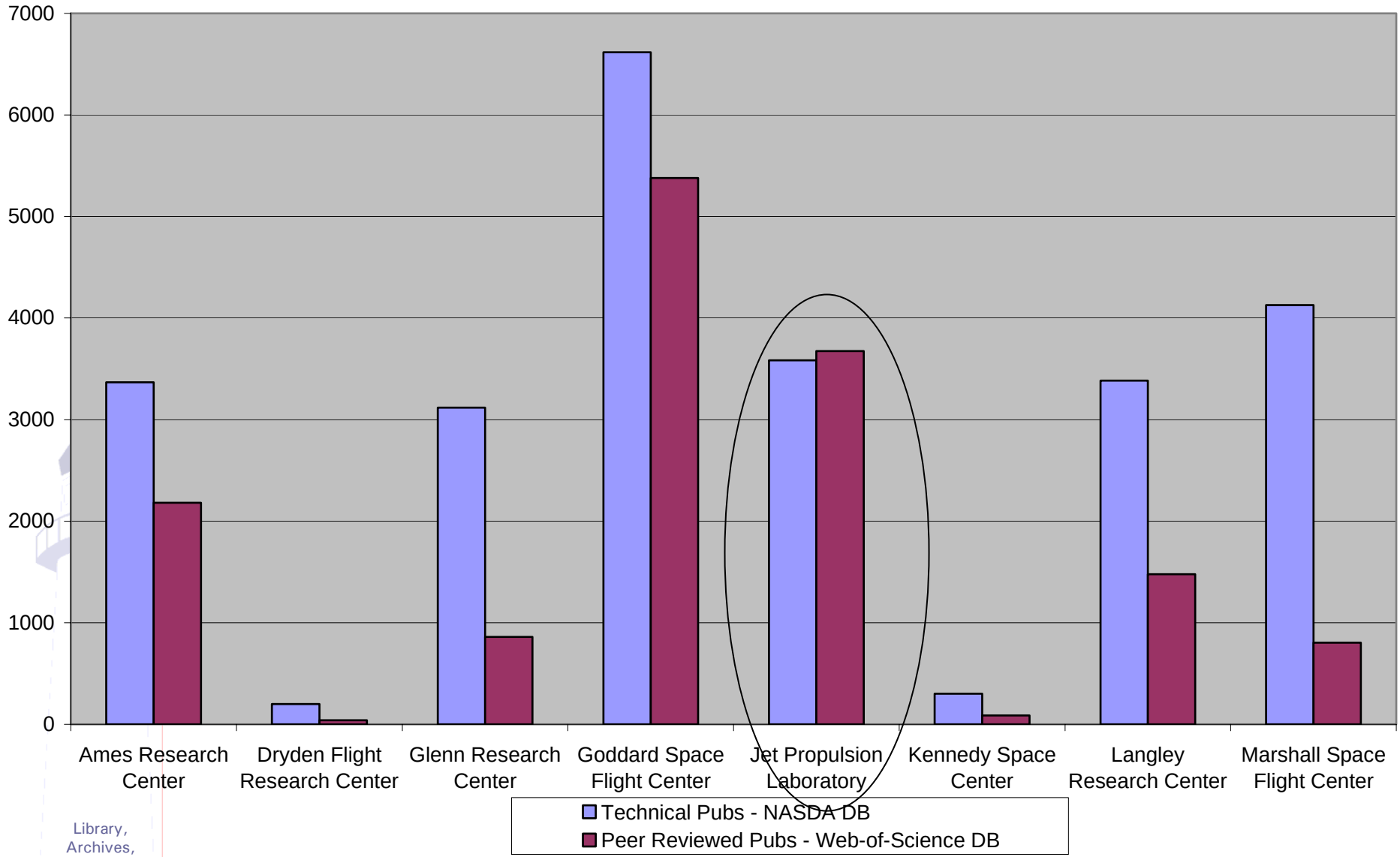
NASA Center Publications: 1999 - 2003



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JPL: Institutional Co-author 1999 - 2003

Count of Affiliation	Center
Affiliation	JPL
California Inst. of Tech.	389
NASA Goddard Space Flight Center	343
Arizona, Univ., Tucson	231
NASA Ames Research Center	218
Geological Survey (US)	165
California Univ., Los Angeles	117
Cornell Univ.	116
Washington Univ., Saint Louis	115
Arizona State Univ., Tempe	110
National Oceanic and Atmospheric Administration	98
Harvard Univ.	89
Los Alamos National Lab.	81
NASA Glenn Research Center	78
NASA Langley Research Center	75
Colorado, Univ., Boulder	70
NASA Marshall Space Flight Center	68
NASA Johnson Space Center	64
Massachusetts Inst. of Tech.	57
Southwest Research Inst.	57
NASA HQ	53
California Univ., Berkeley	52
Stanford Univ.	50
Academy of Sciences (USSR)	48
Hawaii, Univ., Honolulu	46
Michigan Univ., Ann Arbor	43

Collaboration between NASA Centers : NASD Database 1999 - 2003

	Co-authors' organization affiliation												
	ARC	**DFRC**	**GRC**	**GSFC**	**JPL**	**KSC**	**LaRC**	**MSFC**	**HQ**	**JSC**	**SSC**	**WS**	**Wallops**
Ames		4	17	139	**242**	20	143	18	23	52	1	0	0
Dryden	2		5	0	1	3	**52**	4	0	2	0	0	0
Glenn	23	2		40	60	4	43	**83**	8	22	0	2	1
Goddard	124	0	64		**306**	1	140	193	56	9	2	0	37
JPL	218	1	99	**343**		16	75	68	53	64	2	0	7
Kennedy	**21**	9	9	1	13		14	8	5	12	0	1	0
Langley	115	54	65	**148**	84	10		60	24	81	1	2	4
Marshall	32	4	84	**204**	63	8	57		29	28	1	2	7

NASD: What Worked Well (for us)

- XML output allows easy data manipulation
- Saved search feature worked well
- Ability to quickly search the thesaurus for different fields is helpful in creating queries
- Good indexing and relatively consistent data

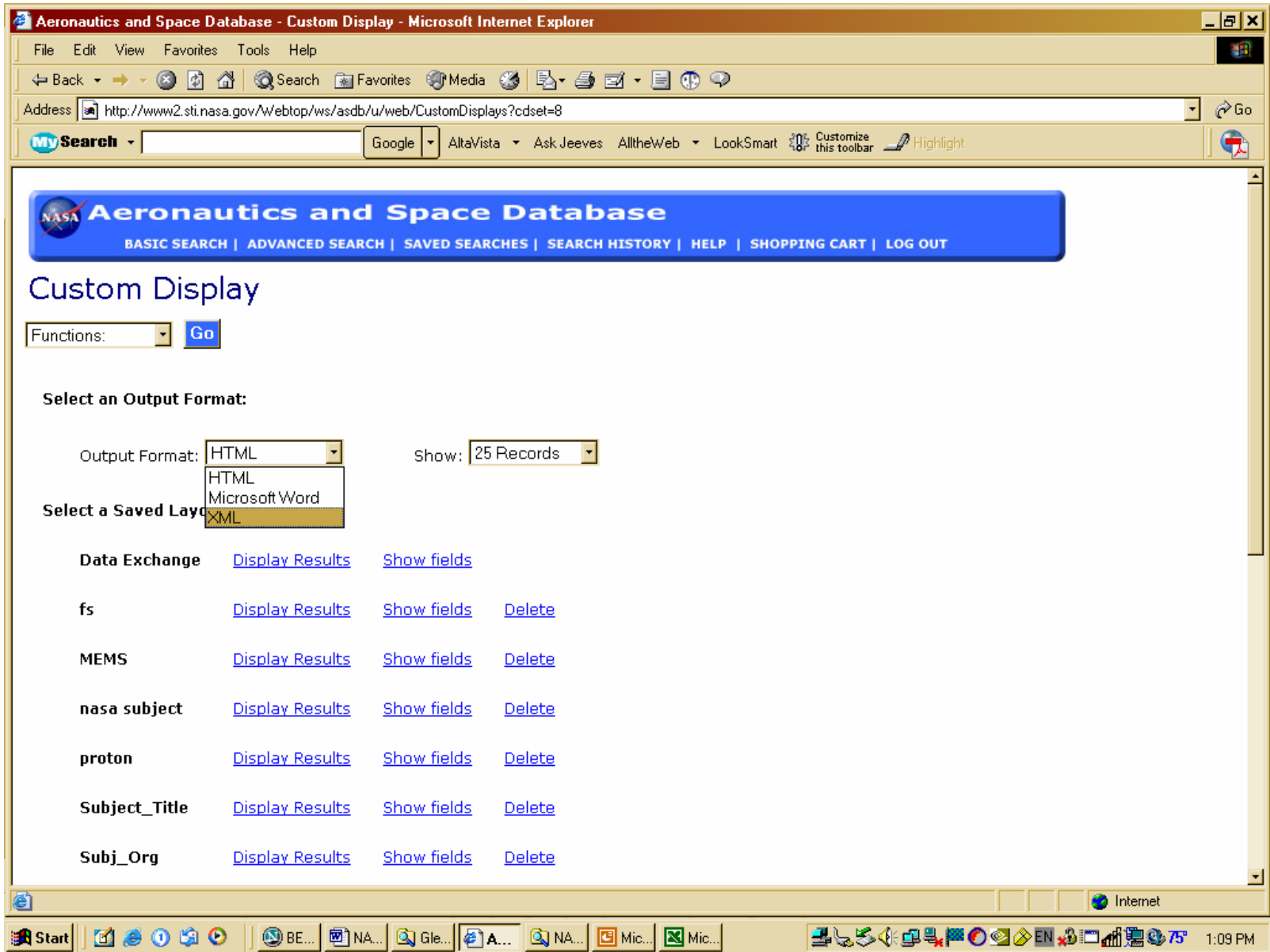
NASD: What was difficult (for us)

- Complex searches were “difficult” to implement in NASD. Have to do searches in the correct order to combined multiple search statements correctly
- Saved a download preferences, it only saved the *fields* we wanted. Had to re-enter the output format each time
- Variant spellings for index terms: affiliation data not consistent.

Basic Process

- XML Download
- Cleanup of data
- Tabulating and Charting

XML Download



Clean Up! : the fun part

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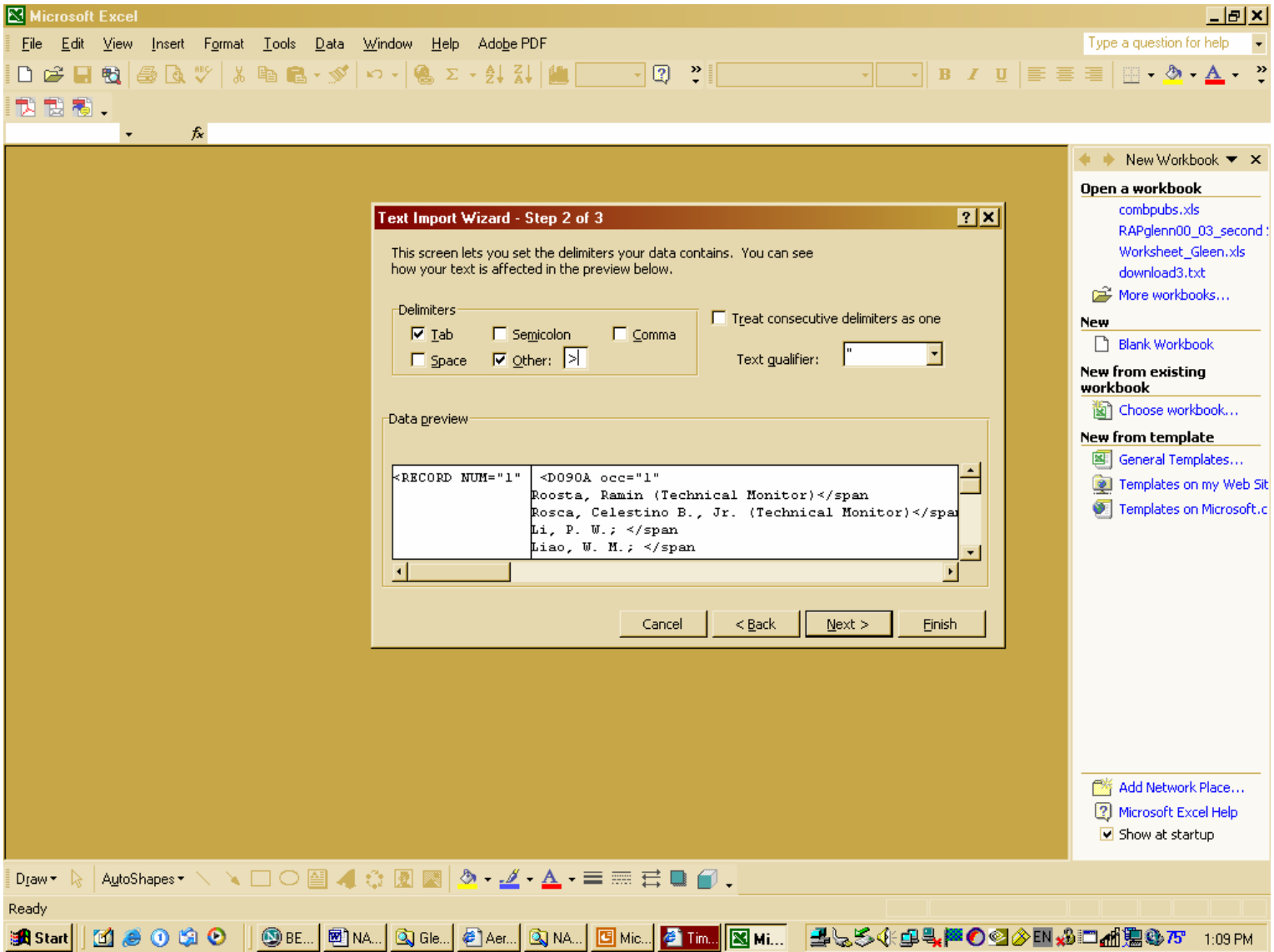
Importing XML data into Excel



Final Processing

	A	B	C	D	E	F	G	H	I	J
1	Li, P. W.; </span	Department of Electrical Engineering, National Central University, Chung Li; Taiwan</span								
2	Brenner, R.; </span	Centre for Quantum Computer Technology, School of Physics, The University of New South Wales; Sydney NSW 2052</span								
3	Kimura, T.; </span	Quantum Nano-Scale Magnetics Laboratory, RIKEN FRS; 2-1 Hirosawa, Wako, Saitama 351-0198</span								
4	Roach, Pat (Technical M	</span								
5	Elibol, O. H.; </span	Laboratory of Integrated Biomedical Micro/Nanotechnology and Applications, Birck Nanotechnology Center, School of Electrical and Compute								
6	Suh, Kahp Y.; </span	Department of Chemical Engineering, Massachusetts Institute of Technology; Cambridge, MA 02139</span								
7	Zalalutdinov, Maxim; </s	Cornell Center for Material Research, Cornell University; Ithaca, NY 14853-2501</span								
8	Topcu, Suat; </span	Laboratoire LIRIS, Universite de Versailles; 45 avenue des Etats-Unis, 78035 Versailles</span								
9	Bourov, Geuorgui K.; </s	Department of Physics, University of Central Florida; Orlando, FL 32816-2385</span								
10	Rogers, B.; </span	Department of Mechanical Engineering and the Nevada Ventures Nanoscience Program, University of Nevada, Reno; Reno, NV 89557</span								
11	Xia, Qiangfei; </span	NanoStructure Laboratory, Department of Electrical Engineering, Princeton University; Princeton, NJ 08544</span								
12	Zhou, Yangxin; </span	Department of Physics and Astronomy and Laboratory for Research on the Structure of Matter, University of Pennsylvania; 209 South 33rd St								
13	Lee, S. W.; </span	Laboratory of Integrated Biome ical Micro/Nanotechnology, Birck Nanotechnology Center, School of Electrical and Computer Engineering, De								
14	Sakuma, M.; </span	IMRAM, Tohoku University, K ehira 2-1-1, Aoba-ku, Sendai; 980-8577</span								

	A	B	C	D
1	Authors	Institution	Department	Address
2	Bozhevolnyi, Sergey I.;	Aalborg University		
3	Volkov, Valentyn S.;	Aalborg University		
4	Bozhevolnyi, Sergey I.;	Aalborg University		
5	Bozhevolnyi, Sergey I.;	Aalborg University	Institute of Physics	
6	Beermann, Jonas;	Aalborg University	Institute of Physics	
7	Delin, A.;	Abdus Salam International Center		
8	Tosatti, E.;	Abdus Salam International Center		
9	Lee, Chau-Hwang;	Academia Sinica	Institute of Applied Science and Engineering Research	128 Academia Road
10	Mong, Hong-Yao;	Academia Sinica	Institute of Applied Science and Engineering Research	128 Academia Road
11	Lin, Wan-Chen;	Academia Sinica	Institute of Applied Science and Engineering Research	128 Academia Road
12	Liu, N. W.;	Academia Sinica	Institute of Atomic and Molecular Sciences	P.O. Box 23-166
13	Datta, A.;	Academia Sinica	Institute of Atomic and Molecular Sciences	P.O. Box 23-166

Final Tabulating Done in Excel